What is claimed is:

1 1. An interleaving method comprising the steps of:

2   arranging data to be transmitted in a matrix;

3 and

4   randomly rearranging at least either columns

5 or rows of said data and outputting said rearranged

6 data in time series.

1 2. A de-interleaving method comprising the steps of:

2   arranging received data having been

3 interleaved in a matrix; and

4   randomly rearranging at least either columns

5 or rows of said data, and outputting said data in time

6 series, thereby outputting said received data in the

7 order before said received data was interleaved.

1 3. An interleaving apparatus for interleaving data

2 to be transmitted, comprising:

3   a first storing unit for storing data to be

4 transmitted; and

5   a first control unit for controlling said

6 first storing unit so that said data to be transmitted

7 is outputted from said first storing unit with said

8 data to be transmitted arranged in a matrix and at

9 least either columns or rows of said data to be

10 transmitted randomly rearranged.

1 4. The interleaving apparatus according to claim 3,
2 wherein said first control unit comprises a first
3 write controlling unit for generating a write address
4 to be used to write said data to be transmitted in said
5 first storing unit with said data to be transmitted
6 arranged in a matrix and at least either columns or
7 rows of said data to be transmitted randomly
8 rearranged and for writing said data to be transmitted
9 in said first storing unit, and said first control unit
10 reads said data to be transmitted stored in said first
11 storing unit in the order of addresses.

1 5. The interleaving apparatus according to claim 4,
2 wherein said first write control unit comprises a
3 column number generating unit for randomly generating
4 column numbers and a row number generating unit for
5 randomly generating row numbers, and said first
6 write control unit writes said data to be transmitted
7 in said first storing unit with numbers generated by
8 said column number generating unit and said row number
9 generating unit as said write address to write said
10 data to be transmitted in said first storing unit.

1 6. The interleaving apparatus according to claim 5,
2 wherein each of said column number generating unit and
3 said row number generating unit is configured with a

4   memory for holding numbers used as addresses in a

5   predetermined order.

1   7. The interleaving apparatus according to claim 3,

2   wherein said first control unit writes said data to

3   be transmitted in said first storing unit in the order

4   of addresses, and said first control unit comprises

5   a first read controlling unit for generating a read

6   address to be used to read said data to be transmitted

7   from said first storing unit with said data to be

8   transmitted stored in said first storing unit arranged

9   in a matrix and at least either columns or rows of said

10 data to be transmitted randomly rearranged to read

11 said data to be transmitted.

1   8. The interleaving apparatus according to claim 7,

2   wherein said first read control unit comprises a

3   column number generating unit for randomly generating

4   column numbers and a row number generating unit for

5   randomly generating row numbers, and said first read

6   control unit reads said data to be transmitted from

7   said first storing unit with numbers generated by said

8   column number generating unit and said row number

9   generating unit as said read address.

1   9. The interleaving apparatus according to claim 8,

2   wherein each of said column number generating unit and

3   said row number generating unit is configured with a

4   memory for holding numbers used as addresses in a

5   predetermined order.

1   10. A de-interleaving apparatus for de-interleaving

2   received data, comprising:

3   a   second   storing   unit   for   storing   said

4   received data; and

5   a second control unit for controlling said

6   second storing unit so that said received data is

7   outputted from said second storing unit in a state

8   before said received data was interleaved by arranging

9   said   received   data   in   a   matrix   and   randomly

10 rearranging at least either columns or rows of said

11 received data.

1   11.   The   de-interleaving   apparatus   according   to

2   claim 10, wherein said second control unit comprises

3   a second write control unit for generating a write

4   address to be used to write said received data in said

5   second storing unit in a state before said received

6   data was interleaved by arranging said received data

7   in a matrix and randomly rearranging at least either

8   columns or rows of said received data to write said

9   received data, and said second control unit reads said

10 received data stored in said second storing unit in

11 the order of addresses.

1 12. The de-interleaving apparatus according to claim
2 11, wherein said second write control unit comprises
3 a column number generating unit for randomly
4 generating column numbers and a row number generating
5 unit for randomly generating row numbers, and said
6 second write control unit writes said data in said
7 second storing unit with numbers generated by said
8 column number generating unit and said row number
9 generating unit as a write address.

1 13. The de-interleaving apparatus according to claim
2 12, wherein each of said column number generating unit
3 and said row number generating unit is configured with
4 a memory for holding numbers used as addresses in a
5 predetermined order.

1 14. The de-interleaving apparatus according to claim
2 10, wherein said second control unit writes said
3 received data in said second storing unit in the order
4 of addresses, and said second control unit has a second
5 read controlling unit for generating a read address
6 to be used to read said received data in a state before
7 said received data was interleaved from said second
8 storing unit by arranging said received data stored
9 in said second storing unit in a matrix and randomly
10 rearranging at least either columns or rows of said

11 received data and for reading said received data from

12 said second storing unit.

1 15. The de-interleaving apparatus according to claim

2 14, wherein said second read control unit comprises

3 a column number generating unit for randomly

4 generating column numbers and a row number generating

5 unit for randomly generating row numbers, and said

6 second read control unit reads said received data from

7 said second storing unit with numbers generated by

8 said column number generating unit and said row number

9 generating unit as a read address.

1 16. The de-interleaving apparatus according to claim

2 15, wherein each of said column number generating unit

3 and said row number generating unit is configured with

4 a memory for holding numbers used as addresses in a

5 predetermined order.

1 17. An interleaving/de-interleaving system

2 comprising an interleaving apparatus for

3 interleaving data to be transmitted and a de-

4 interleaving apparatus for receiving said

5 transmitted data interleaved by said interleaving

6 apparatus to de-interleave said transmitted data,

7 wherein said interleaving apparatus outputs said data

8 to be transmitted with said data to be transmitted

9   arranged in a matrix and at least either columns or

10   rows of said data to be transmitted randomly

11   rearranged, and said de-interleaving apparatus

12   outputs received data in a state before said

13   transmitted data was interleaved by arranging said

14   received data in a matrix and randomly rearranging at

15   least either columns or rows of said received data.

1   18. An interleaving/de-interleaving apparatus for

2   transmitting/receiving interleaved data to/from an

3   opposite interleaving/de-interleaving apparatus,

4   comprising:

5   an interleaving apparatus for outputting data

6   to be transmitted to said opposite

7   interleaving/de-interleaving apparatus with said

8   data to be transmitted arranged in a matrix, and at

9   least either columns or rows of said data to be

10   transmitted randomly rearranged; and

11   a de-interleaving apparatus for outputting

12   received data interleaved in said opposite

13   interleaving/de-interleaving apparatus in a state

14   before said received data was interleaved by arranging

15   said received data in a matrix, and randomly

16   rearranging at least either columns or rows of said

17   received data.